

## Pond Sealing or Lining – Flexible Membrane (No.) 521A

### DEFINITION

A manufactured hydraulic barrier consisting of a functionally continuous sheet of synthetic or partially synthetic, flexible material.

### PURPOSE

To control seepage from water and waste impoundments for water conservation and environmental protection.

### CONDITIONS WHERE PRACTICE APPLIES

On ponds and water storage structures that require treatment to control seepage rates within acceptable limits.

On waste storage and waste treatment facilities built in or of excavated earth and that require treatment to prevent the migration of contaminants from the site.

### CRITERIA

#### General

Ponds sealed or lined with flexible membranes shall be planned, designed, and installed to meet all federal, state, local and tribal laws and regulations.

Structures to be lined shall have been constructed to meet all applicable NRCS standards. All inlets, outlets, ramps, and other appurtenances may be installed before, during, or after the liner placement, but shall be done in a manner that does not damage or impair the proper operation of the liner.

#### Membrane material

Design of the flexible membrane shall be in accordance with manufacturer recommendations. The membrane shall have adequate tensile strength for the planned slope and anchoring and adequate

puncture resistance for the planned subgrade and cover soil material.

All flexible membrane installations shall meet the material and installation requirements of the plans and specifications provided for each installation and shall be certified as such by the installer.

Minimum Criteria for Membranes	
Type	Limiting Parameter
HDPE	40 mil (1.0 mm) thickness
LLDPE	40 mil (1.0 mm) thickness
PVC	30 mil (0.76 mm) thickness
GCL	0.75 lb./ft <sup>2</sup> (3.7 kg/m <sup>2</sup> ) [bentonite]
EPDM	45 mil (1.1 mm) thickness

HDPE = High Density Polyethylene  
LLDPE = Linear Low Density Polyethylene  
PVC = Polyvinyl Chloride  
GCL = Geosynthetic Clay Liner  
EPDM = Synthetic Rubber

#### Anchoring

Unless otherwise specified by the manufacturer, the liner shall be sized to account for a minimum of 12 inches (300 mm) at the top to be placed in the anchor trench. The anchor trench shall be excavated completely around the area to be lined at the planned elevation of the top of the liner. The anchor trench shall be at least 8 inches (200 mm) deep and 12 inches (300 mm) wide.

#### Side slopes

For exposed membranes, all banks and fills within the area to be lined shall have side slopes of 2:1 or flatter. The design side slope will be governed by the slope stability of the subgrade soil material. A slope stability analysis is required only when there is no prior experience for the type of subgrade soil material.

For earth-covered membranes, all banks and fills within the area to be lined shall have side slopes 3:1 or flatter. The design side slope shall be determined by a stability analysis performed by the manufacturer considering the cover soil material in a saturated

condition and a safety factor of 1.2. The manufacturer may be requested to demonstrate the adequacy of their stability analysis by a field test of the selected liner material with the intended soil cover in place under saturated conditions. The stability analysis must be approved by a qualified licensed engineer.

#### Protective measures

Select soil materials shall be used as cover for liners where required for the proper performance, protection, and durability of the installation. In areas subject to livestock travel, all types of flexible membranes shall be covered with not less than 9 inches (150 mm) of compacted soil material. The protective soil cover thickness is measured perpendicular to the finished surface. Cover soils shall not contain sharp, angular stones or any objects that could damage the liner. Maximum allowable particle size of soil cover material shall be 3/8-in (10 mm), unless the liner is cushioned by a layer of needle-punched, non-woven geotextile. Cover materials shall be stable under all operational and exposure conditions. Follow the manufacturer's recommendations for any additional protective measures.

Subgrade preparation shall conform to manufacturer recommendations. Subgrade materials shall not contain sharp, angular stones or any objects that could damage the liner or adversely impact its function.

All structures shall be fenced to protect the liner from damage and for the safety of humans, livestock, wildlife, and pets.

Manufacturer recommendations shall be followed with regard to protection from weather and exposure to ultraviolet light.

If venting is used, manufacturer recommendations shall be followed regarding vent type and spacing.

#### **CONSIDERATIONS**

Venting should be considered if gas build-up under the liner is anticipated.

If high water tables could adversely affect the proper functioning of the facility, interceptor or relief type drainage systems should be considered to control uplift pressures.

#### **PLANS AND SPECIFICATIONS**

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Support data documentation requirements are as follows:

- Inventory and evaluation records
  - Assistance notes or special report
- Survey notes, where applicable
  - Design survey
  - Construction layout survey
  - Construction check survey
- Design records
  - Physical data, functional requirements and site constraints, where applicable
  - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
  - Location map
  - “Designed by” and “Checked by” names or initials
  - Approval signature
  - Job class designation
  - Initials from preconstruction conference
  - As-built notes
- Construction inspection records
  - Assistance notes or separate inspection records
  - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable

#### **OPERATION AND MAINTENANCE**

An operation and maintenance plan for the pond sealing or lining shall be incorporated into the operation and maintenance plan developed for the structure to be lined. The operation and maintenance

plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design. The plan shall include, but is not limited to, the following provision:

- Make regular inspections and perform repair maintenance as needed to ensure proper functioning.